At many places regular and systematic courses are being given by Weather Bureau men, and at some of the leading universities a professor makes a specialty of the teaching of meteorology. We are anxious that it should be incorporated as a part of the science course in every university. I am of the opinion that some general study of meteorology should be required of persons who are fitting themselves to fill the position of civil engineer, mechanical engineer, geologist, or biologist, and that an elementary knowledge of meteorology and climatology is of prime importance in the study and cure of disease.

LECTURES BY PROFESSOR ABBE.

In addition to his work on the MONTHLY WEATHER REVIEW, the editor, Professor Abbe, has delivered a course of lectures on meterology to students who come to the Weather Bureau. These lectures should, perhaps, properly be considered as preliminary or introductory to those that may be given in future years at Mount Weather. One lecture of two hours' duration was given on consecutive Fridays from January to May, inclusive. The preparation of these lectures required much more time than was originally contemplated, and as the subjects were treated from a mathematical point of view it may be doubted whether they can properly be called popular. However, they presented the latest results of work done by some of the ablest meteorologists in the world. If they could be published they would perhaps be recognized as an extension of the knowledge collected by Hann in his Lehrbuch der Meteorologie. The publication of an English edition of this Lehrbuch is still greatly to be desired, but as the work is a a herculean task it may perhaps be postponed until Professor Hann himself publishes a condensed edition of his volume.

ENCOURAGEMENT AND INCREASE OF EDUCATIONAL WORK.

The general subject of instruction in meteorology given by Weather Bureau men in the form of public lectures or college class work has been kept faithfully in mind. Every case worth mentioning has been noted in the MONTHLY WEATHER REVIEW. Inspectors have been instructed to report fully as to the amount and character of the work and the possibility of increasing it. There is an increasing demand for class work in high schools and colleges. It is not likely that the Weather Bureau employees can fully respond to this demand, partly because of their want of training as teachers, but principally because of the absorption of their time in regular office work. It is to be hoped that our colleges and universities will establish proper positions for teachers of meteorology, and that some of our best men may fill such places when retired from active service in the Weather Bureau. Meanwhile they are doing their best to respond to the demand made upon them.

LIBRARY.

The work of the library has been conducted on the same general lines as in recent years. On June 1, 1904, Dr. W. F. R. Phillips was succeeded by Mr. H. H. Kimball as librarian, climatologist, and supervising examiner.

The library is being used more and more as the work of the Bureau expands. Employees detailed to special lines of reseach need first of all to become familiar with the methods and results of others doing similar work. The library, therefore, becomes their starting point, and hence the necessity for having the books and pamphlets so arranged and indexed that all that relates to any given subject may be readily found.

As set forth in former reports, it has been the aim of the librarian to supplement the author index of books and pamphlets with a subject index, and this in turn with a bibliography of meteorological and allied topics made up from papers that appear in the periodicals of this and other countries. The bibliography is kept up to date, and most of the titles that are added to it are also published month by month in the MONTHLY WEATHER REVIEW for the benefit of students. The subject index of books and pamphlets is still incomplete, however, and work upon it will be pushed during the coming year as fast as the resources of the library will permit.

The accessions during last year amount to 550 titles, of which 82 were by purchase and the remainder by exchange or gift. The total number of accessions now amounts to 24,680 books and 4430 pamphlets, besides a number of miscellaneous works not catalogued.

Accessions are now limited to books and pamphlets bearing directly upon the science of meteorology. Many of these are the periodical publications of foreign governments and of scientific societies in all parts of the world; they contain so much that is of interest and value to meteorological students that it is plainly our duty to preserve them carefully.

A small collection of text-books, such as are required by observers in preparing for examinations for promotion, and also a few meteorological works of a more advanced character, is maintained at stations. Under the supervision of the library this collection of books is added to year by year as funds will permit. So many station officials are engaged in educational work in connection with high schools and colleges that a small library of this kind is necessary, although books are loaned to these officials from the central office library when practicable.

EXAMINATIONS FOR PROMOTION.

During the year 55 requests for examination were received by the supervising examiner and favorably acted upon. The subjects in which examinations are now given are arranged as follows:

1. For eligibility for promotion to the $1000 grade: Arithmetic, English grammar, elementary meteorology.
2. For eligibility for promotion to the $1200 grade: Algebra, elementary physics, plane trigonometry.
3. For eligibility for promotion to the $1400 grade: Astronomy, plant physiology, advanced meteorology.

As a rule, all the subjects in a group are given at one examination. Of the 55 examinations held during the year 25 were on subjects in the first group, 21 in the second group, and 9 in the third group. Only five persons received less than the passing grade (70 per cent) on any subject.

Since one of the primary objects of these examinations is to elevate the educational standard among Weather Bureau employees, it is gratifying to note that the number of those who pass the examinations in the higher grades is increasing.

INSTRUMENTS AND EXHIBITIONS.

The Instrument Division is charged with the duties of providing, testing, adjusting, and supervising the installation of all meteorological instruments and storm-warning towers. During the past year the exhibits of the Weather Bureau at the Louisiana Purchase Exposition, St. Louis, were prepared and installed by the professor in charge of the division.

PRESENT STATUS OF STATION EQUIPMENTS.

The status of the instrumental equipment of stations at the close of business, June 30, 1904, was as follows:

One hundred and fifty-eight stations were completely equipped—that is, were supplied with instruments by means of which automatic records are made of the direction and the velocity of the wind, the duration of sunshine, the amount and the time of beginning and ending of rainfall, and, finally, the temperature and the pressure of the air. Of these stations the following were newly equipped with complete sets of apparatus, namely: Birmingham, Ala.; Modena, Utah (old station reequipped); Yellowstone Park, Wyo.; Maritime Exchange, New York; Brooklyn Eagle Building, Brooklyn, N. Y.; and Honolulu, Oahu, Hawaii. The number of completely equipped stations has been increased by twenty during the past year.

The following table shows the total number of the principal instruments in actual service:

Triple registers	166
Barographs	202
Thermographs	165
Tele-thermographs	8
Tipping-bucket rain gages	152
Electrical sunshine recorders	144
Photographic sunshine recorders	15

With one or two exceptions the stations that are not at present completely equipped are of slight importance, and, in general, have all the instruments necessary to the satisfactory performance of their work.

EQUIPMENT OF STORM-WARNING STATIONS.

The equipment of 26 selected stations with storm-warning towers and improved high-power lanterns was undertaken at the beginning of the year. The funds available for this were limited, and notwithstanding the fact that a considerable amount of other work was taken up, including the installation of an exceptionally high tower (115 feet) at the Delaware Breakwater, Delaware, nearly all have been brought to a very satisfactory state of completion.

Almost a year is required in work of this kind, for the reasons that owing to the special nature of the towers, lanterns, etc., they are not carried in stock by contractors, but require to be manufactured after orders are placed, viz, after the beginning of the fiscal year. From sixty to ninety days are required for this purpose, and the shipment of towers to stations, the locations of which are often relatively inaccessible, consumes additional time. During this interim leases and other arrangements are made for title to the site of the towers, and bids for their erection and the installation of lights are obtained. Owing to the severity of the winters in the Lake regions it is necessary, in certain cases, to defer until springtime the erection and installation of towers and lanterns planned for during the winter.

At the close of business June 30, 149 steel towers, with improved auxiliary equipment, had been installed at as many stations distributed over the shores of the Great Lakes and the Atlantic and Pacific seacoasts.

High-power electric lanterns are installed at 77 stations, and improved oil lights at 68 stations. The towers at 3 stations are used for flag displays only.

The present plans contemplate the equipment of 10 additional stations, supplies for which have been ordered.

EXPOSITION WORK.

The preparation of the exhibit to be made by the Weather Bureau at St. Louis was actively taken up by the professor in charge of the instrument division, and practically all the apparatus and material required was boxed and ready for shipment February 1, 1904. Shipment was made a few days thereafter, and additional supplies, consisting of a special glass weather map, swinging chart frames (clusters), instrument cases, etc., were forwarded from Detroit, Mich. Nothing was injured or delayed in any way in transit. The work of installation began promptly on April 6 and was completed on April 29, the day before the opening, with the exception of the charging of the storage batteries and the installation of a special automatic card-printing press. The shipment of the latter had been unavoidably delayed, and the wiring of the building for electric current had not been completed. These deficiencies were supplied, however, in the course of a few weeks, and the exhibit was turned over to Mr. E. H. Bowie, in charge of the station at St. Louis, on May 21.

TELEGRAPH SERVICE.

TELEGRAPHIC REPORTS.

To meet as far as possible the pressing demands for a wider distribution of the daily telegraphic reports of observations, arrangements were perfected at the close of the year for a very generous increase in the number of such reports telegraphed over circuits or as special messages, to go into effect on July 1, 1904; including the establishment of a new circuit between Fort Worth, Tex., and St. Louis, Mo., with intermediate stations at Oklahoma, Okla., Wichita and Kansas City, Kans., and Hannibal, Mo. While for economic reasons it is impracticable to satisfy all demands in this respect, it is believed that the present distribution of reports, resulting in a much more comprehensive display of weather conditions on the maps and bulletins issued at stations, will give general satisfaction, both to the public and to the officials charged with making district or local forecasts.

The services rendered by the principal telegraph companies in collecting and distributing the reports of observations and in telegraphing the daily forecast messages from the several district centers were as a rule, prompt and efficient. Complaints of delays, errors, and other irregularities, when brought to the notice of the proper telegraph officials, received prompt attention and corrective action.

TELEGRAPH AND TELEPHONE LINES.

A new 3-conductor submarine telegraph cable was laid from the mainland to Block Island, R. I., a distance of eleven miles, on September 3, 1903. Preparations are now under way for laying submarine cables from near Nags Head to Manteo (Roanoke Island), N. C., from South Manitou to North Manitou Island, Lake Michigan, and from Flavel, Oreg., across the mouth of the Columbia River, to Fort Canby, Wash. All of these, it is expected, will be in operation within the next few months.

No old lines were abandoned or new ones built during the year.

The total receipts from commercial telegrams sent over Weather Bureau lines were $4,669.35, of which amount $2,337.33 was for United States tolls and was covered into the Treasury, and $2,332.02 was paid over to connecting commercial lines.

VESSEL REPORTS.

The reorganization, at the beginning of the year, of the vessel and wreck reporting service of the Weather Bureau, with additional stations at Sand Key, Fla., and Southeast Farallon, Cal., has largely added to the effectiveness of this popular feature of the Bureau, and has been much appreciated by maritime interests generally. Vessel and wreck reports are now furnished free of all charges, except for telegraph tolls over commercial lines, to all corporations and individuals who may apply for them. The average number of vessels reported per month from each designated station was as follows: Cape Henry, Va., 1000; Jupiter, Fla., 57; Sand Key, Fla., 87; Point Reyes Light, Cal., 80; Southeast Farallon, Cal., 25; North Head, Wash., 112, and Tatoosh Island, Wash., 264.

Besides reporting passing vessels, these stations rendered important services in connection with wrecks and other maritime disasters. A brief account of the more striking cases follows:

On October 28, 1903, the schooner *Wempe Bros.* was wrecked on Bonilla Point, Vancouver Island. The Weather Bureau observer at Tatoosh Island telegraphed for assistance, which arrived in time to save the crew, but the vessel proved a total loss.

The U. S. torpedo boat *Moccasin* went ashore near Currituck Inlet, North Carolina, December 3, 1903. The Weather Bureau repairman at that point immediately opened a wreck station on the beach and put himself in direct telegraphic communication with the commandant's office at the Norfolk Navy-Yard, to convey all information and instructions to and from the scene of the wreck. Special acknowledgment was made by the Navy Department of the valuable services rendered in this connection.

On February 22, 1904, the schooner *Frank W. Howe* was observed by the North Head, Washington, station to be flying signals of distress. The observer promptly responded with